DOCUMENT RESUME

ED 270 998 FL 015 763

AUTHOR Abu-Salim, Issam M.
TITLE More on Arabic Vowel Harmony: A Metrical-Suprasegmental Approach.
PUB DATE Apr 83
NOTE 18p.; In: Proceedings of the Annual Linguistics Conference (2nd, Irbid, Jordan, April 1983). See FL 015 762.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Arabic; Language Research; Linguistics; *Linguistic Theory; *Phonology; *Suprasegmentals; *Vowels
IDENTIFIERS *Prefixes

ABSTRACT

A purely segmental or suprasegmental analysis of vowel harmony in Arabic is inadequate because it leaves some questions unanswered. An approach based primarily on the metrical structure of the utterance and addressing an independent structural category, the "foot" of the word, that phonological rules may refer to, is preferred, especially when amplified by some features of the suprasegmental approach to phonological rules. It is proposed that the foot is the domain of the vowel harmony rule in the sense that, for example, a vowel /i/ will become /u/ in the vicinity of another vowel /u/ if the two vowels share the same foot, and the foot, not the stem, is specified for the feature [round]. This approach explains why certain prefixal vowels are not harmonized. The stem is seen as having a significant role in limiting the segments that may be harmonized. (MSE)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED270998

MORE ON ARABIC VOWEL HARMONY: A METRICAL-SUPRASEGMENTAL APPROACH

Issam M. Abu-Salim

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Jonathan Owens
Issam Abu-Salim
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
✗ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

In this paper, vowel harmony (henceforth, VH) refers to the process whereby high unround vowels acquire the feature [+ round] in the context of high round vowels, as illustrated by the examples in (1-2) with verbal roots:[1]

(1)	a.	yí-fham	'he understands'
	b.	tí-ᶜmal	'you (m.sg.)/she work(s)
	c.	yí-lbis	'he wears'
	d.	tí-nzil	'you (m.sg.)/she descend(s)
(2)	a.	yú-drus	'he studies'
	b.	yú-ḥrus	'he guards'
	c.	tú-ktub	'you (m.sg.)/she write(s)
	d.	tú-ṭlub	'you (m.sg.)/she ask(s)

In (1), where the root (stem minus affixes) contains either a [-high] vowel (1a,b) or a [-round] vowel (1c,d), the prefixal vowel remains unround, whereas in (2) the prefixal vowel is realized as /u/ since the root contains a $\begin{bmatrix}+\text{high}\\+\text{round}\end{bmatrix}$ vowel.

This phenomenon is also observed in words with nominal stems, but in this case the harmonizing vowel precedes the harmonized one, as shown in (3-4) where the rightmost vowel in (3) appears as /i/ because it is preceded by an unround vowel in the stem, and as /u/ in (4) since the preceding vowel is $\begin{bmatrix}+\text{high}\\+\text{round}\end{bmatrix}$:[2]

FL015763

(3)a.	ʔákil	'food'	(4)a.	shúɢul	'work'
b.	fíhim	'understanding'	b.	fúrun	'oven'
c.	báɢil	'mule'	c.	ʿúrus	'wedding'
d.	jísir	'bridge'	d.	kúfur	'atheism'

Both cases of VH, the regressive harmony in (2) and the progressive harmony in (4), apply to verbal forms amplified by vowel-initial subject suffixes:

(5)a.	yú-durs-u	(</yi-drus-u/)	'they study'
b.	tú-kutb-i	(</ti-ktub-i)	'you (f.sg.) write'
c.	tú-hurs-u	(</ti-hrus-u)	'you (pl.) guard'

These forms, along with their assumed underlying representations, show an alternation between a CVCC root shape in the surface forms and a CCVC root shape in their corresponding underlying forms (cf. also the examples in (2) with CCVC roots.) One of the possible analyses of this alternation is found in Kenstowicz (1981) where the two rules of VH mentioned above are utilized in the derivation of the CVCC alternant in the following way: First, the leftmost vowel undergoes the regressive harmony rule by which it becomes /u/ after it has been assigned primary stress. Next a syncope[3] rule that is operative in the language will have a chance to delete the penultimate vowel. This will produce an intermediate structure with a three-consonant cluster which will trigger epenthesis to apply to that structure, thus inserting an /i/ before the last two consonants of the cluster. The inserted vowel will then undergo the progressive harmony rule to become /u/. This analysis is illustrated by the following derivation of (5a):[4]

(6)

/yi-drus-u/	
yí-drus-u	stress assignment
yú-drus-u	regressive harmony
yú-drs-u	syncope
yú-dirs-u	epenthesis
yú-durs-u	progressive harmony

Although this analysis accounts for the bidirectionality of VH as observed in (6), Kenstowicz opts for adopting a suprasegmental analysis of this phenomenon in Arabic phonology. One of the motivations for the suprasegmental treatment of VH is, according to Kenstowicz, its ability to express VH as a unitary process. The segmental analysis fails to achieve this end in spite of the phonetic similarity and the parallel conditioning environments of both the regressive and progressive harmony rules: the former rule has to apply before syncope and epenthesis, while the latter has to follow these two rules. Thus, it is not possible, given the familiar principles for collapsing rules, to express the two rules in a single schema.

The rest of this paper is organized in the following way: First, Kenstowicz' suprasegmental analysis of VH in Arabic is briefly reviewed and shown to be partially inadequate in view of his definition of the 'stem'. Second, a slightly revised analysis of the stem whereby <u>all</u> prefixes come to participate in forming it is given. And, finally, an alternative account of VH based primarily on the metrical structure of the utterance is introduced.

Kenstowicz' suprasegmental analysis views VH as a process by which the suprasegmental feature [+round] is mapped onto all the high vowels in the stem. The prefixal and epenthetic vowels are specified as [-round] and represented as /i/ whereas the root's vowel, when it is high, is not specified for roundness and is represented as /I/ which is neutral with respect to the feature [+round] . The phonetic realization of /I/ as either /i/ or /u/ depends on whether the stem is specified as [+round] or [-round] . Consequently, words such as <u>tukutbi</u> 'you (f.sg.) write' would have the underlying representation in (7), where <u>r</u> stands for the feature [round], and the derivation in (8):

(7) $\underset{+r}{[\text{ti-ktIb}]\text{i}}$

(8)

[tí-ktIb]i	stress assignment
+r	
[tí-ktb]i	syncope
+r	
[tí-kitb]i	epenthesis
+r	
[ti-kitb]i	mapping (=VH)
+r	
tú-kutb-i	surface form

In this derivation, mapping is ordered after epenthesis to account for the rounding of the epenthetic vowel /i/ when in-
ted inside the stem. We will see later that vowels inserted
side the stem do not undergo harmony in the same way and are
allowed from doing so by the same mechanism that disallows underlying vowels outside the stem from undergoing VH.

Kenstowicz concludes that a grammar with this suprasegmental analysis of VH in Arabic is descriptively more adequate than a grammar involving two uncollapsible rules of VH or a rule of metathesis whose main function is to rewrite the two rules of syncope and epenthesis by taking a CCVC root directly into a CVCC one when followed by a vowel-initial suffix (cf, Kenstowicz 1981:459 for more information on this rule). But in spite of its advantage over the other two analyses, Kenstowicz' suprasegmental analysis is still inadequate in some other respects. One of the inadequacies of his analysis pertains to the definition of the <u>stem</u>. In Kenstowicz (1981:458) the stem is analyzed into the person-number prefix and the root. Other prefixes, such as the present-tense prefix <u>bi-</u>, and all suffixes are analyzed outside the stem boundaries. The motivation for treating suffixes in this way with respect to VH is obvious: suffixal vowels do not undergo VH and,

BEST COPY AVAILABLE

moreover, they do not trigger preceding vowels to undergo the rule, as illustrated by the following examples with subject and object suffixes:

(9)a. yú-kutb-u 'they write'
b. yí-nizl-u 'they descend'
c. tú-durb-i 'you (f.sg.) hit'
d. tí-himl-i 'you (f.sg.) carry'

(10)a. yu-drúb-ni 'he beats me'
b. yú-xutb-ik 'he proposes to you (f.sg.)'
c. yi-hibs-úuk 'they arrest you (m.sg.)'
d. yi-misk-úu-ni 'they catch me'

These examples show clearly that suffixal front vowels remain unround although preceded by round vowels in the stem (9c,d) and (10a,b) and do not result in any changes in the preceding or following context despite the fact that they are round (9a,b) and (10c,d). Thus, it is not unreasonable to analyze suffixes as outside the stem since, unlike prefixes, they do not show that sort of "affinity-to-the-root" principle regarding the VH rule.

However, the motivation for preventing the present-tense prefix bi- from participating in forming the stem while allowing for other prefixes to do so is rather weak and unjustified. Kenstowicz' main argument for his analysis of the present-tense prefix is that its vowel does not undergo VH in examples such as bitshúuf (</bi-ti-shuuf/) 'see (3sg.f. present)'. In fact, his motivation for treating that prefix as such is just to explain the failure of the leftmost vowel /i/ in the aforementioned example to undergo VH. This analysis is quite untenable and incompatible with the availability of further data which show that the prefix bi- escapes harmony in such cases not because it is analyzed outside the stem but for another reason having to do with the foot-affiliation of the root's

vowel or controlling segment, and the vowels to be harmonized. In fact, there are cases where the prefix bi- appears to undergo VH in the same way other prefixes do, as shown in (11):

(11)a. bú-ktub 'he writes'
b. bú-durs-u 'they study'

A deeper analysis of thses items, however, reveals that the prefixal vowel in such cases is not that of the prefix bi- but that of the subjunctive prefix yi-, as will be illustrated below. Even so, the prefix bi- is not to be treated as being different from the other prefixes and it, therefore, will be analyzed as part of the stem.

Before the alternative analysis of VH is presented, it would be worthwhile to discuss briefly the morphological and phonological properties of the present-tense prefixes in the dialect under investigation. One of the motivations for this discussion is to show the exceptional behavior of such prefixes not only towards VH, but also towards other phonological rules as well, particularly syncope. Consider, for instance, words like bishúuf 'see (3sg.m. indicative)'. Not only does the leftmost vowel escape VH, but it also escapes syncope although it is in an unstressed open syllable, a position that usually invokes the syncope rule to apply. This exceptional behavior of the prefix bi- invites various possible analyses to derive words having such prefixes from underlying structures having other elements that are deleted throughout the derivation. Before coming to any conclusion regarding those missing elements, let us look at the following paradigm which will shed some light on the underlying structures of the present-tense prefixes:

(12)		Subjunctive	Indicative	
a. 2 sg	tú-drus	t-rúuh	b-tú-drus	bi-t-rúuh
b. 2 sg f	tú-durs-i	t-rúuh-i	b-tú-durs-i	bi-t-rúuh-i
c. 2 pl	tú-durs-u	t-rúuh-u	b-tú-durs-u	bi-t-rúuh-u

(12)

		Subjunctive		Indicative	
d.	1 sg.	ʔá-drus	ʔa-rúuh	bá-drus	ba-rúuh
e.	3 sg m	yú-drus	y-rúuh	bú-drus	bi-rúuh
f.	3 pl	yú-durs-u	y-rúuh-u	bú-durs-u	bi-rúuh-u
		'study'	'go'	'study'	'go'

The examples in (12a-c) show that the subjunctive forms have a CV subject prefix in the case of tri-radical roots and a C prefix in the case of bi-radical roots. This CV-C alternation can be easily accounted for by means of the syncope rule mentioned above.[5] The subjunctive forms in the second column will then be derived from underlying representations having CV prefixes, as illustrated by the following derivation of t-rúuh.[6]

(13) /ti-ruuh/
ti-rúuh stress assignment
t-rúuh syncope

The examples in (12a-c) also show that the indicative forms have the following structure: present tense (indicative) prefix, subjunctive prefix, and the root which is followed in some cases by a subject suffix. The CV-C alternation exhibited by the surface realization of the present tense prefix is also accounted for by syncope. Consequently, words such as btúdrus and bitrúuh will have the underlying structures /bi-ti-drus/ and /bi-ti-ruuh/, respectively. The initial stages in the derivation of these two words are as follows:

(14a) /bi-ti-drus/
bi-tí-drus
b-tí-drus

b) /bi-ti-ruuh/
bi-ti-rúuh stress assignment
bi-trúuh syncope

The correct phonetic forms are then derived after VH is applied to (14a).

The examples in (12d-f), on the other hand, uncover a second type of alternation. The subjunctive forms in this group have prefixes starting with the glottal stop /ʔ/ in (12d) and the glide /y/ in (12e, f), which unexpectedly disappear from the indicative forms. Their absence along with the effect of syncope yields indicative forms with no overt

subjunctive prefixes. Thus, the grammar of the dialect under investigation would involve a rule, the exact formulation of which is irrelevant to the present study, to delete the glottal stop and the glide /y/ in those forms. The derivation of birúuh would, consequently, proceed as follows:

(15) /bi-yi-ruuh/

bi-yi-rúuh	stress assignment
bi-y-rúuh	syncope
bi-rúuh	glide-deletion[6]

Thus, it seems, given this analysis of the subjunctive and indicative forms, all the subject and present-tense prefixes are of the CV type, the C alternant being basically derived by syncope and other rules such as glide-deletion. This conclusion is relevant to the subsequent discussion and will explain, among other things, the immunity of the high vowel /i/ in words like bishúuf against both syncope and VH.

The alternative analysis of VH proposed in this paper is partly based on the suprasegmental analysis of VH in Palestinian Arabic given in Kenstowicz (1981) and partly on the metrical approach to phonological rules elaborated in McCarthy (1979), Selkirk (1980), and Hayes (1980), among others, and on the revised definition of the stem given above. Two categories will be of some significance to the present discussion. The first category is the foot. It will be argued that the foot is the domain of the VH rule in the sense that a vowel /i/ will become /u/ in the vicinity of another vowel /u/ if the two vowels share the same foot. And the second category is the stem since only vowels within the stem undergo VH. Moreover, it will be argued that it is the foot, not the stem, that is going to be specified for the feature round . Accordingly, some feet will be specified as [+round] and others as [-round]. This means that if a foot is specified as [+round], all high vowels within the domain of that foot will be phonetically realized as /u/. Of course, the mapping of the feature

[+round]onto high vowels will take place at a later stage in the derivation so as to account for applying VH to epenthetic vowels within feet.

To see how this analysis will work, consider first of all simple cases like yúdrus (</yi-drus/) 'to study (3 sg.m. subjunctive)' and shuɡul (</shuɡl/) 'work'. These two items will have the following underlying structures, where σ stands for the category 'foot':[9]

(16)a. [yIdrIs] (+r) b. [shIɡl] (+r)

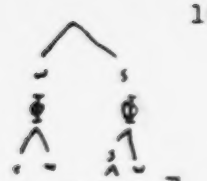
Epenthesis will apply to the structure in (16b) to break the final consonant cluster by inserting the vowel /i/ between the last two consonants, thus yielding the structure in (17):[10]

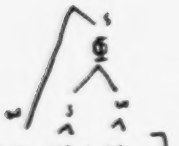
(17) [shIɡIl] (+r)

Finally, the feature [+r] is mapped onto all the high vowels in the foot, which is coextensive with the stem in this case, to yield the structures in (18):

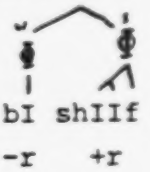
(18)a. [yIdrIs] (+r) = yúdrus b. [shIɡIl] (+r) = shuɡul

That the category 'foot' is significant in the discussion of VH in Arabic can be illustrated by examples such as bishúuf (</bi-yi-shuuf/) 'see (3 sg.m. indicative)' where the prefix bi- does not undergo harmony. This is to be contrasted with examples such as búktub (</bi-yi-ktub/) 'write (3 sg.m. indicative)' where the prefix bi- seems to undergo harmony. The initial representations for these two items are the following:

(19)a. 

b. 

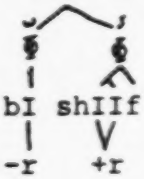
In (19a) there are two feet, the second of which is specified as [+r], whereas in (19b) there is only one foot and it is specified as [+r], too. Syncope and glide-deletion would apply to the structures in (19a,b) to yield the representations in (20a,b):[11]

(20)a. 

b.

It is to be noted in this regard that it is the second wel in (19a) that is syncopated and, after glide-deletion, e initial syllable bi- is left dominated by a foot node. us, the /i/ in that syllable escapes syncope although the foot dominating it is weak (cf. Selkirk (1980)). In (18b), on the other hand, it is the /I/ of the initial syllable that is syncopated since it is in a weak metrical position that is not a foot.

The structures in (20a,b) will now be subjected to VH, or, in other words, mapping the feature [round] to the high vowels in the segmental string. This mapping results in the structures in (21a,b):

(21)a. 

= bishúuf

b.

= búktub

The vowel dominated by the first foot in (21a) is realized as /i/ whereas the two vowels in the second foot are realized as /u/ since the first foot is marked [-r] and the second [+r],

BEST COPY AVAILABLE

although both feet are located in the same stem. In (21b), on the other hand, both the prefixal vowel and the root vowel are realized as /u/ because they are dominated by the same foot that is marked [+r]; in this case the foot is coextensive with the stem.

This analysis explains why the prefixal vowel in examples like bi-shúuf does not undergo VH. If the 'foot' analysis were not present, one would endorse analyses like Kenstowicz' whereby the present-tense prefix is analyzed outside the stem. The present analysis, moreover, accounts for the opaque structure in examples like bishúuf where the first high vowel escapes syncope although it occurs in an unstressed open syllable. We have seen that the initial syllable in bishúuf is left exclusively dominated by a foot node after syncope and glide-deletion have applied. Being a foot, although weak, implies some degree of prominence, as pointed out in Selkirk (1980:565). Thus, it seems that the category 'foot' protects the first vowel in bishúuf against syncope. This syncope rule must then be restricted to affect only weak nodes that are not feet.

Thus far, the stem has not been shown to be relevant to the present analysis of VH in Arabic. All that has been argued for is that the foot is the domain of VH. This conclusion should be complemented by another statement emphasizing the significant role of the stem in limiting the segments that may undergo harmony, given that suffixal vowels do not undergo harmony, as can be seen in the following examples:

(22)a. b-tú-kutb-i / *b-tu-kutb-u
(</bi-ti-ktub-i/) 'you (f.sg.) write'

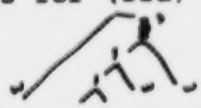
b. b-tú-kutb-u (</bi-ti-ktub-u/) 'you (pl) write'

(23) bú-ʔumr-ik/ *bu-ʔumr-uk 'he orders you (f.sg.)'

The suffix /i/ in (22a) remains unround although it is preceded by the vowel /u/ in the stem. Applying the harmony rule to that vowel would result in the incorrect form which is homophonous with (22b) which has a different subject. The same thing is observed in (23) where the wrong form is derived if the rule applies to the object suffix -ik.

It is to be noted, however, that the suffixes -i and -ik in (22a) and (23), respectively, share the same foot with parts of the preceding stem, as can be seen in the following initial representations for (22a) and (23):[12]

(24)a. bI-tI-ktIb-I



b. bI-yI-ʔmIr-ik

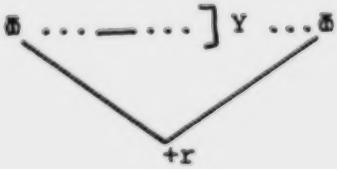
spite of this, the suffixes -i and -ik escape harmony. It ems then that the stem boundary is relevant in deciding which owels do undergo harmony. Consequently, the structures in (24a,b) can be re-represented as in (25a,b), where the brackets indicate stem boundaries:

(25)a. [bI-tI-ktIb] i

b. [bI-yI-ʔmIr] ik

The VH rule must then be formulated in a way that makes reference to both the stem and foot categories. A possible formulation of the rule is given in (26):

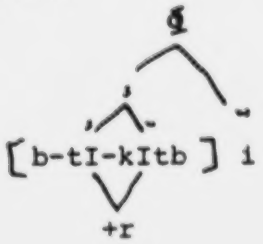
(26) I → u/[X Φ ... — ...] Y ...Φ



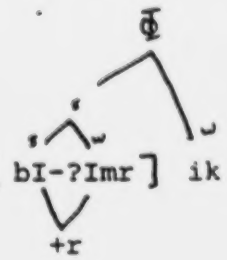
where X and Y may be Ø

BEST COPY AVAILABLE

This rule says that a high vowel will acquire the feature [+round] if it is located inside a stem and is dominated by a foot specified as [+r]. The structures in (25a,b) would consequently be transformed into those in (27a,b) as a result of applying rule (26) after syncope, epenthesis, and glide-deletion have applied.

(27)a. 

= btúkutbi

b. 

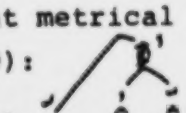
= bú?umrik

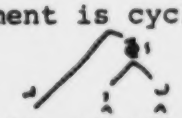
Epenthetic vowels which are inserted outside the stem do not undergo harmony, either. We have seen earlier (the derivation in (8)) that when the epenthetic vowel /i/ is inserted inside the stem it generally undergoes harmony when it meets the conditional environment of the rule. But when it is inserted outside the stem, it fails to undergo harmony even if it comes to share a foot with a preceding round vowel, as illustrated by the following examples, where the underlined /i/ is epenthetic:

(28)a. buktúbish / *buktúbush
(</bi-yi-ktub-s/) 'he does not write'

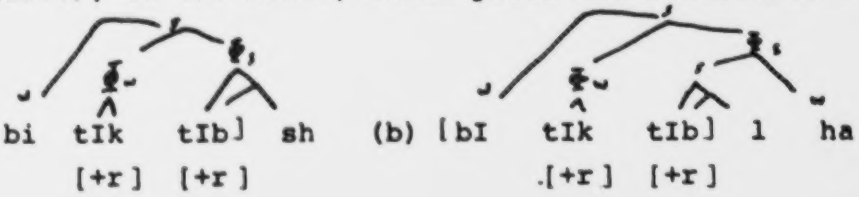
b. btuktúbilha /*btuktúbulha
(</bi-ti-ktub-l-ha/) 'she writes to her'

The initial representations for these examples are the following, given that metrical structure assignment is cyclic (Kiparsky, 1979):

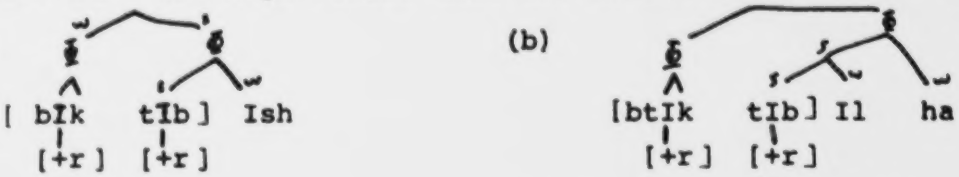
(29)a. 

b. 

Subsequent assignmentof metrical structure on the super-ordinate cycles, on the one hand, and foot-restructuring as in McCarthy (1980), on the other, would yield the structures in (30a,b):



Finally, rule (26) would now apply to associate the feature [+r] with all the stem high vowels that are dominated by the same foot:



This mapping would consequently yield the correct phonetic forms <u>buktúbish</u> and <u>btuktúbilha</u> where the epenthetic vowels are realized as /i/, although they are dominated by feet specified as [+round].

In summary, we have seen that a purely segmental or supra-segemntal analysis of VH in Arabic is inadequate since it leaves some of the questions unanswered. The metrical approach presented in this article, whereby the category 'foot' is recognized as an independent structural unit that phonological rules may refer to, seems to be superior, especially when it is amplified by some features of the suprasegmental approach to phonological rules as outlined in Clements (1976) and Goldsmith (1976, 1979).

NOTES

[1]All examples cited in this paper are drawn from a dialect spoken in various parts of Palestine and Jordan. The present analysis is, however, valid for describing other dialects of Arabic as well.

[2]These examples are generally analyzed as having underlying stem of the form CVCC, the surface alternant CVCVC being derived by an epenthesis rule which inserts the vowel /i/ in certain contexts to break consonant clusters. (For more information about this rule, see Brame (1973)).

[3]Syncope has the effect of deleting short high vowels in unstressed open syllables (cf. Brame (1973)).

[4]Cf. Kenstowicz (1981).

[5]No attempt has been made to derive the CV alternant from underlying C by epenthesis given that epenthetic vowels do not receive stress (cf. Abu-Salim (1982a) for cases where epenthetic vowels are assigned primary stress.)

[6]The underlying prefixal vowel is taken to be /i/, the /u/ alternant being derived by VH.

[7]It is possible to derive this form after applying syncope simultaneously to the first two vowels, since they both meet the conditional environment of the rule, and then inserting the vowel /i/ by epenthesis to break the resulting three-consonant cluster. We will see later, however, that it is only the second vowel that is syncopated.

[8]This derivation does not account for the immunity of the first vowel against syncope. A possible analysis of this apaque structure is given later in this article.

[9]See Abu-Salim (1982b) for more information on the structure of the foot in Palestinian Arabic.

[10]In the present analysis, all stem high vowels as well as the epenthetic vowel /i/ will be represented as /I/. Their phonetic realization as /i/ or /u/ is later determined by the feature specification of the foot dominating them.

[11]Syncope only affects high vowels that are labelled <u>w</u> in metrical structures.

[12]Since suffixal vowels do not undergo VH, the unspecified vowel /I/ will not be used to represent them, otherwise, the underlying contrast between the various suffixes will be lost (cf. (22a) and (22b)).

REFERENCES

Abu-Salim, I. (1982a) "Syllable Structure and Syllabification in Palestinian Arabic." Studies in the Linguistic Sciences 10.2:1-28.

---------- (1982b) A Reanalysis of Some Aspects of Arabic Phonology: A Metrical Approach. Unpublished Univ. of Illinois dissertation.

Brame, M. (1973) "On Stress Assignment in two Arabic Dialects", in S. Anderson and P. Kiparsky, eds. A Festchrift for Morris Halle, New York: Holt, Rinehart and Winston.

Clements, G. (1976) "The autosegmental treatment of vowel harmony", in W. Dressler and O. Pfeiffer, eds. Phonologica. Innsbruck.

Goldsmith, J. (1976) Autosegmental Phonology. Bloomington: Indiana Univ. Linguistics Club.

---------- (1979) "The aims of autosegmental phonology", in D. Dinnsen, ed., Current Approaches to Phonological Theory. Bloomingon: Indiana Univ. Press.

Hayes, B. (1980) A Metrical Theory of Stress Rules, Ph.D. dissertation, M.I.T.

Kenstowicz, M. (1981) "Vowel harmony in Palestinian Arabic: a suprasegmental analysis", Linguistics 19:449-465.

Kiparsky, P. (1979) "Metrical Structure Assignment is Cyclic", Linguistic Inquiry 10:421-442.

McCarthy, J. (1979) Formal Problems in Semitic Phonology and Morphology, Ph.D. dissertation, M.I.T.

---------- (1980) "A note on the accentuation of Damascene Arabic", SLS 10.2:77-98.

Selkirk, E. (1980) "The role of Prosodic Categories in English word stress", LI 11:563-605.